

The Revenue Functions of a Monopoly

At the opposite end of the market spectrum from perfect competition is monopoly. A monopoly exists when only one firm sells the good or service. This means the monopolist faces the market demand curve since it has no competition from other firms. If the monopolist wants to sell more of its product, it will have to lower its price. As a result, the price (P) at which an extra unit of output (Q) is sold will be greater than the marginal revenue (MR) from that unit.

! Student Alert: P is greater than MR for a monopolist.

- Table 3-10.1 has information about the demand and revenue functions of the Moonglow Monopoly Company. Complete the table. Assume the monopoly charges each buyer the same P (i.e., there is no price discrimination). Enter the MR values at the higher of the two Q levels. For example, since total revenue (TR) increases by \$37.50 when the firm increases Q from two to three units, put “+\$37.50” in the MR column for Q = 3.



Table 3-10.1

The Moonglow Monopoly Company

Q	P	TR	MR	Average revenue (AR)
0	\$100.00	\$0.00	—	—
1	\$87.50	\$87.50	+\$87.50	\$87.50
2	\$75.00	\$150.00	+\$62.50	\$75.00
3	\$62.50	\$187.50	+\$37.50	\$62.50
4	\$50.00	\$200.00	+\$12.50	\$50.00
5	\$37.50	\$187.50	−\$12.50	\$37.50
6	\$25.00	\$150.00	−\$37.50	\$25.00
7	\$12.50	\$87.50	−\$62.50	\$12.50
8	\$0.00	\$0.00	−\$87.50	\$0.00

- Draw the demand (D), AR, and MR curves in Figure 3-10.1. Plot the MR values at the higher of the two Q levels.



Figure 3-10.1

Monopoly's Demand, Average Revenue, and Marginal Revenue Curves

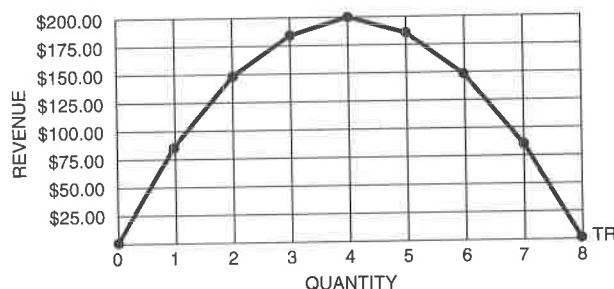


3. Plot the firm's TR curve in Figure 3-10.2.



Figure 3-10.2

Monopoly's Total Revenue Curve



4. We see in Table 3-10.1 that the price at which the firm can sell three units is \$62.50. Yet the MR from the third unit is only \$37.50. How do you explain this difference?
- When the firm lowers its price from \$75.00 to \$62.50 to increase sales from 2 units to 3 units, two things happen to total revenue:*
- (1) *It receives \$62.50 in new total revenue from the sale of the third unit.*
 - (2) *It has a loss in total revenue of \$25.00 from the first two units this period: (2)(\$75.00 - \$62.50) = \$25.00. The marginal revenue of the third unit is the sum of these two effects = +\$62.50 - \$25.00 = +\$37.50. Because the firm cannot sell 3 units at the same price at which it sold 2 units, the price of the third unit is greater than the marginal revenue from that unit.*

5. Why does the vertical gap between the firm's D curve and MR curve get larger as the firm sells more output?

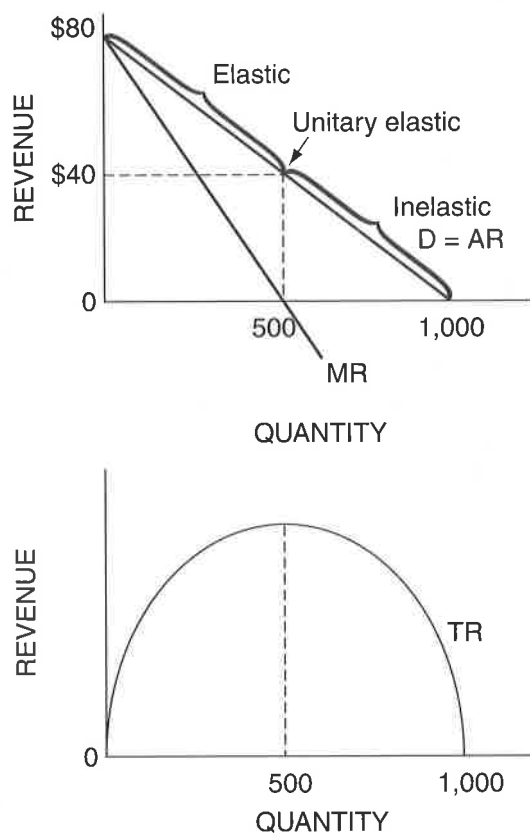
This is because the loss in total revenue from the first units resulting from lowering the price to sell one more unit gets larger as the firm's total output increases. In other words, the value in Part (2) of the solution to Question 4 gets bigger as the firm's output gets bigger.

Table 3-10.1 is an example of a *discrete* case because it has a small number of observations (output varies from zero to eight units). Figure 3-10.3 is an example of a *continuous* case because it is based on a large number of observations. Answer Questions 6–8 based on Figure 3-10.3.



Figure 3-10.3

A Continuous Example of a Monopoly's Revenue Curves



6. Indicate clearly in the top graph of Figure 3-10.3 the elastic, unitary elastic, and inelastic portions of the D curve. Explain your answer.

Based on the total revenue test, we know demand is elastic if total revenue rises when price is reduced. Total revenue does not change if demand is unitary elastic. Demand is inelastic if total revenue falls when price is lowered. If the demand curve is linear and downward sloping, then the upper half of the demand curve is elastic, the midpoint is unitary elastic, and the lower half is inelastic.

7. Marginal revenue is found using the ratio $MR = \Delta TR / \Delta Q$. This is also the formula for the slope of the TR curve. Thus, $MR = \text{slope of the TR curve}$.
- (A) Over what range of output is the slope of the TR curve positive? Over what range of output is the firm's MR positive?
Over the first 499 units
- (B) Over what range of output is the firm's MR negative? Over what range of output is the slope of the TR curve negative?
Over those units from 501 to 1,000
- (C) Over what range of output is the slope of the TR curve equal to zero? Over what range of output is the firm's MR equal to zero?
At the 500th unit
8. What is the maximum dollar value of TR this firm can receive?
 $500 \times \$40 = \$20,000$.

Bonus Question!

9. When the Galaxy Firm lowers its price from \$60 to \$57, the number of units it sells increases from 36 to 39. What is the value of MR? How should you interpret this value?
As a result of selling three extra units, the firm's total revenue increases by \$63 (\$2,160 to \$2,223). Since marginal revenue refers to the extra revenue from one more unit of output, you need to use the MR formula: $MR = \Delta TR / \Delta Q = +\$63 / +3 \text{ units} = +\21 . The interpretation of this MR value is that the firm's total revenue increases by \$21 for each of the three extra units.